

AMENDMENTS TO THE CLAIMS

Claim 1. (Currently Amended) An image pickup apparatus comprising:

a solid-state image pickup device for acquiring an image signal by photoelectric conversion of an optical image formed;

signal amplifying means for amplifying, as to the image signal supplied from said solid-state image pickup device, all pixels of color components of an image according to given gains of the individual color components;

average value calculating means for calculating average values of pixel values of individual color components constituting an image of each frame generated by said signal amplifying means; and

gain calculating means for calculating gains by comparing, for the number of frames in one cycle of flicker generation, maximum values of the average values of the pixel values of the individual color components of the image of each frame, which average values are calculated by said average value calculating means for all the frames in one cycle of flicker generation, calculating maximum values using the average values for all the frames in one cycle of flicker generation, for calculating, calculating gains according to the maximum values, gains for adjusting the average values to a maximum range the average values of the pixel values of the individual color components constituting other images, and for outputting the gains as gains of the individual color components to be supplied to said signal amplifying means.

Claim 2. (Currently Amended) An image pickup apparatus comprising:

a solid-state image pickup device for acquiring an image signal by photoelectric conversion of an optical image formed;

an AD converter for converting the image signal fed from said solid-state image pickup device to a digital signal;

digital signal amplifying means for amplifying, as to the digital image signal supplied from said AD converter, all pixels of color components of an image according to given digital gains of the individual color components;

average value calculating means for calculating average values of pixel values of individual color components constituting an image of each frame generated by said digital signal amplifying means; and

digital gain calculating means for calculating gains by comparing, for the number of frames in one cycle of flicker generation, maximum values of the average values of the pixel values of the individual color components of the image of each frame, which average values are calculated by said average value calculating means for all the frames in one cycle of flicker generation, calculating maximum values using the average values for all the frames in one cycle of flicker generation, for calculating digital gains according to the maximum values, digital gains for adjusting the average values to a maximum range ~~the average values of the pixel values of the individual color components constituting other images,~~ and for outputting the digital gains as digital gains of the individual color components to be supplied to said digital signal amplifying means.

Claim 3. (Original) The image pickup apparatus according to claim 2, wherein said digital gain calculating means calculates deviation of a flicker generation cycle caused by a power supply frequency error from average values of pixel values of individual color components constituting an image of each frame, which average values are calculated by said average value calculating means; calculates the average values of the pixel values passing through correction of the deviation of the flicker generation cycle calculated; calculates, as to the number of frames in one cycle of the flicker generation, maximum values of the average values of the pixel values passing through the correction of the deviation of the individual color components of the image of each frame; and calculates, according to the maximum values, digital gains for adjusting to a maximum range the average values of the pixel values of the individual color components constituting other images.

Claim 4. (Original) The image pickup apparatus according to claim 2, further comprising sine wave data calculating means for calculating, by using a sine wave data table prepared in

advance, sine wave data for estimating deviation of a next cycle of the flicker generation according to a sine wave data table number input, wherein

said digital gain calculating means calculates deviation of a flicker generation cycle caused by a power supply frequency error from average values of pixel values of individual color components constituting an image of one flicker cycle, which average values are calculated by said average value calculating means; estimates a sine wave data table number from the deviation calculated; obtains sine wave data of a next cycle from said sine wave data calculating means according to the sine wave data table number estimated; calculates the average values of the pixel values passing through correction of the deviation in the next flicker generation cycle according to the sine wave data in the next cycle; calculates, as to the number of frames in one cycle of the flicker generation, maximum values of the average values of the pixel values passing through the correction of the deviation of the individual color components of the image of each frame; and calculates, according to the maximum values, digital gains for adjusting to a maximum range the average values of the pixel values of the individual color components constituting other images.

Claim 5. (Original) The image pickup apparatus according to claim 2, wherein when fluctuations in the average values of the pixel values of the individual color components constituting the image of each frame, which average values are calculated by said average value calculating means, exceeds a predetermined value, said digital gain calculating means halts update of the digital gains to be supplied to said digital signal amplifying means, and uses instead digital gains based on the average values of the pixel values before exceeding the predetermined value.

Claim 6. (Original) The image pickup apparatus according to claim 2, further comprising exposure time calculating means for calculating, as to the number of frames of one cycle of the flicker generation, a maximum value of the average values of the pixel values of a particular color component of the image of each frame, which average values are calculated by said average value calculating means, and for controlling, according to the maximum value, exposure

duration of the solid-state image pickup device such that an amount of charges stored in said solid-state image pickup device becomes constant by adjusting to a maximum range the average values of the pixel values of the particular color component, wherein

said digital gain calculating means calculates, as to the number of frames in one cycle of the flicker generation, maximum values of the remaining color components not used by said exposure time calculating means from among the average values of the pixel values of the individual color components of the image, which average values are calculated by said average value calculating means, calculates, according to the maximum values, digital gains for adjusting to a maximum range the average values of the pixel values of the remaining color components, and supplies the digital gains to said digital signal amplifying means.

Claim 7. (Original) The image pickup apparatus according to claim 2, further comprising analog signal amplifying means, which is placed before said AD converter, for amplifying an analog image signal supplied from said solid-state image pickup device according to a given analog gain of the individual color components; and

analog gain calculating means for calculating, as to the number of frames of one cycle of the flicker generation, a maximum value of the average values of the pixel values of a particular color component of the image of each frame, which average values are calculated by said average value calculating means, for calculating, according to the maximum value, the analog gain for adjusting the average values of the pixel values of the particular color component to an maximum range, and for outputting the analog gain as the analog gain of the individual color components to be supplied to said analog signal amplifying means,

said digital gain calculating means calculates, as to the number of frames in one cycle of the flicker generation, maximum values of the remaining color components not used by said analog gain calculating means from among the average values of the pixel values of the individual color components of the image, which average values are calculated by said average value calculating means, calculates, according to the maximum values, digital gains for adjusting to a maximum range the average values of the pixel values of the remaining color components, and supplies the digital gains to said digital signal amplifying means.

Claim 8. (New) A method for image processing comprising:

acquiring an image signal by photoelectric conversion of an optical image formed;
amplifying as to the image signal supplied from said solid-state image pickup device, all pixels of color components of an image according to given gains of the individual color components;

calculating average values of pixel values of individual color components constituting an image of each frame generated by said signal amplifying means;

calculating gains by comparing the average values of the pixel values of the individual color components of the image of each frame calculated by said average value calculating means for all the frames in one cycle of flicker generation;

calculating maximum values using the average values for all the frames in one cycle of flicker generation;

calculating gains according to the maximum values for adjusting the average values to a maximum range; and

outputting the gains as gains of the individual color components to be used when amplifying the image signal.

Claim 9. (New) A method for image processing comprising:

acquiring an image signal by photoelectric conversion of an optical image formed;
converting the image signal fed from said solid-state image pickup device to a digital signal;

amplifying, as to the digital image signal supplied from said AD converter, all pixels of color components of an image according to given digital gains of the individual color components;

calculating average values of pixel values of individual color components constituting an image of each frame generated by said digital signal amplifying means;

calculating gains by comparing the average values of the pixel values of the individual color components of the image of each frame calculated by said average value calculating means for all the frames in one cycle of flicker generation;

calculating maximum values using the average values for all the frames in one cycle of flicker generation;

calculating digital gains according to the maximum values for adjusting the average values to a maximum range; and

outputting the digital gains as digital gains of the individual color components to be used when amplifying the digital image signal.